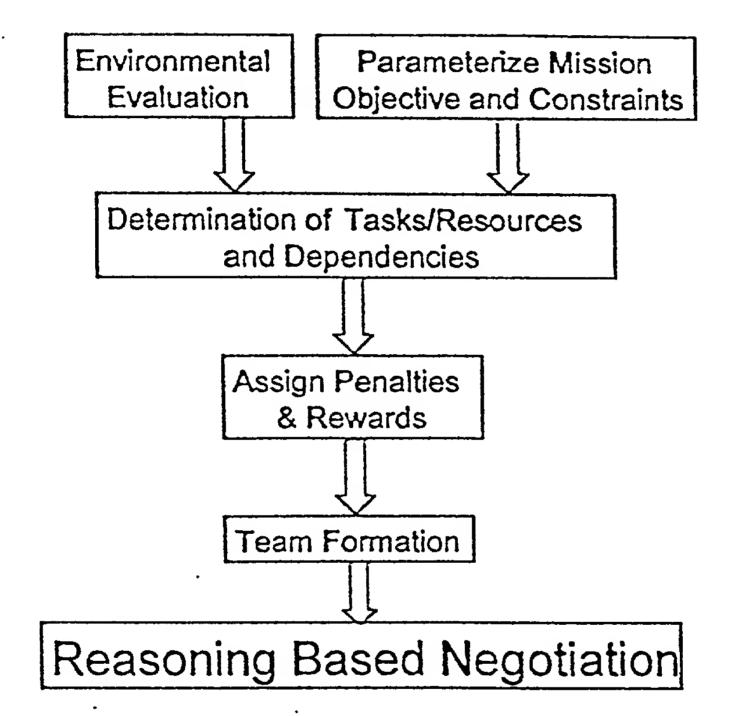
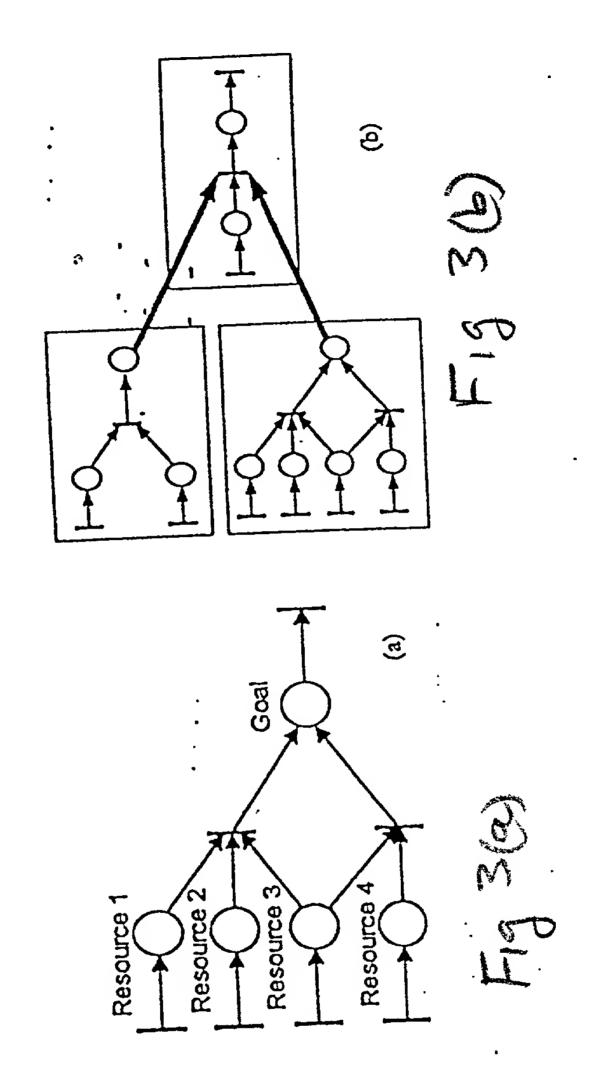
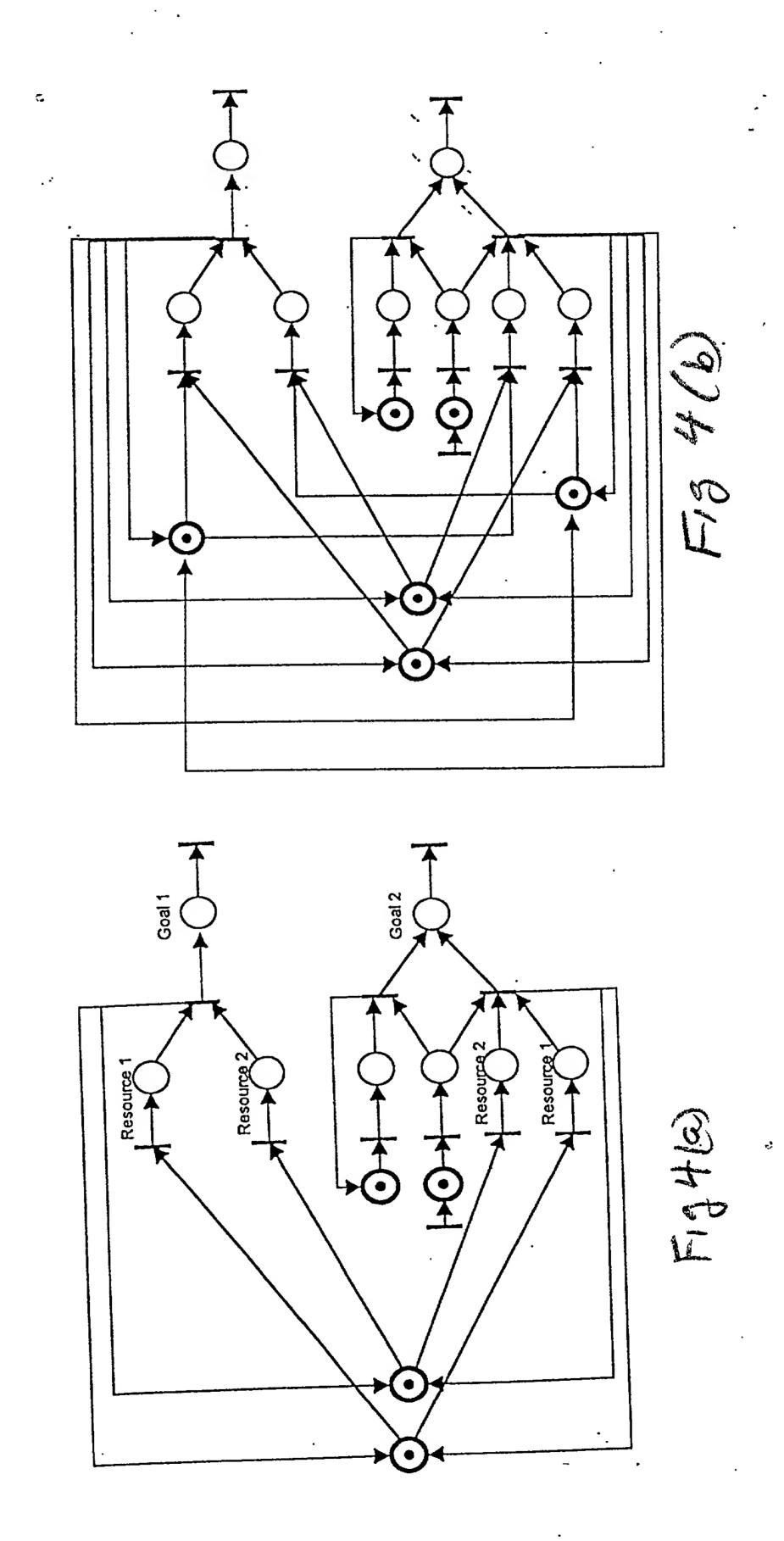


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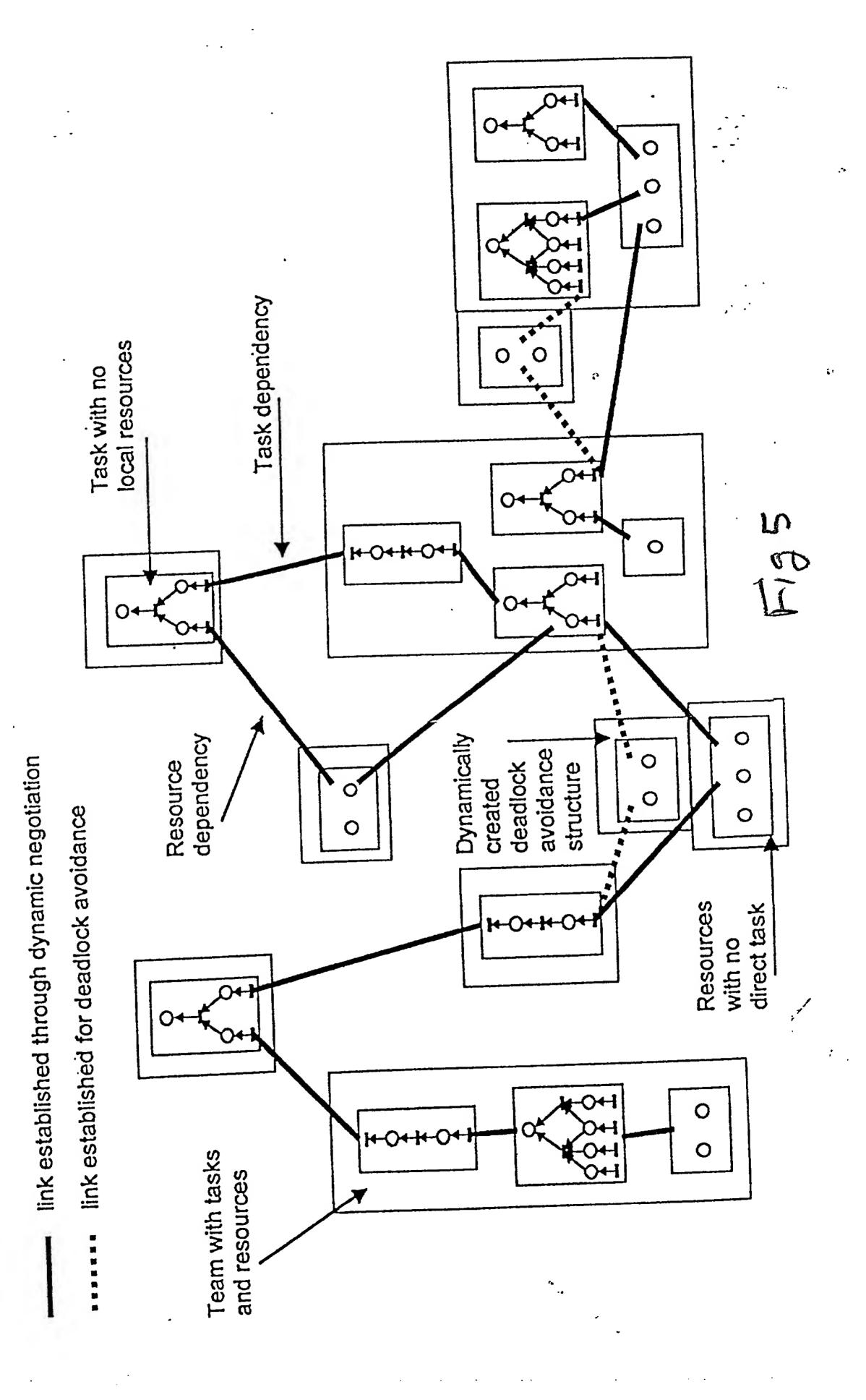


Fig. 6 Network of central authority and agent machines

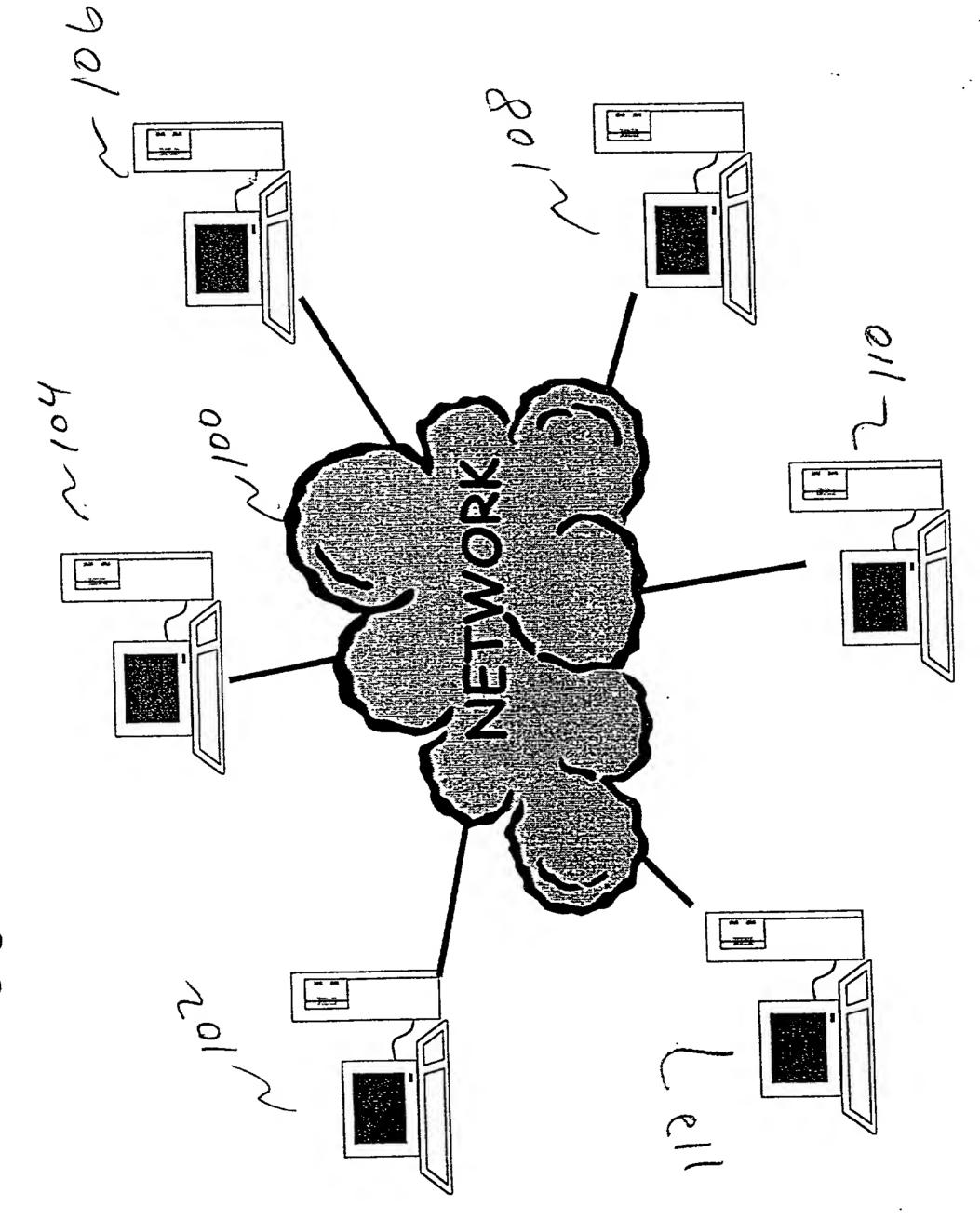
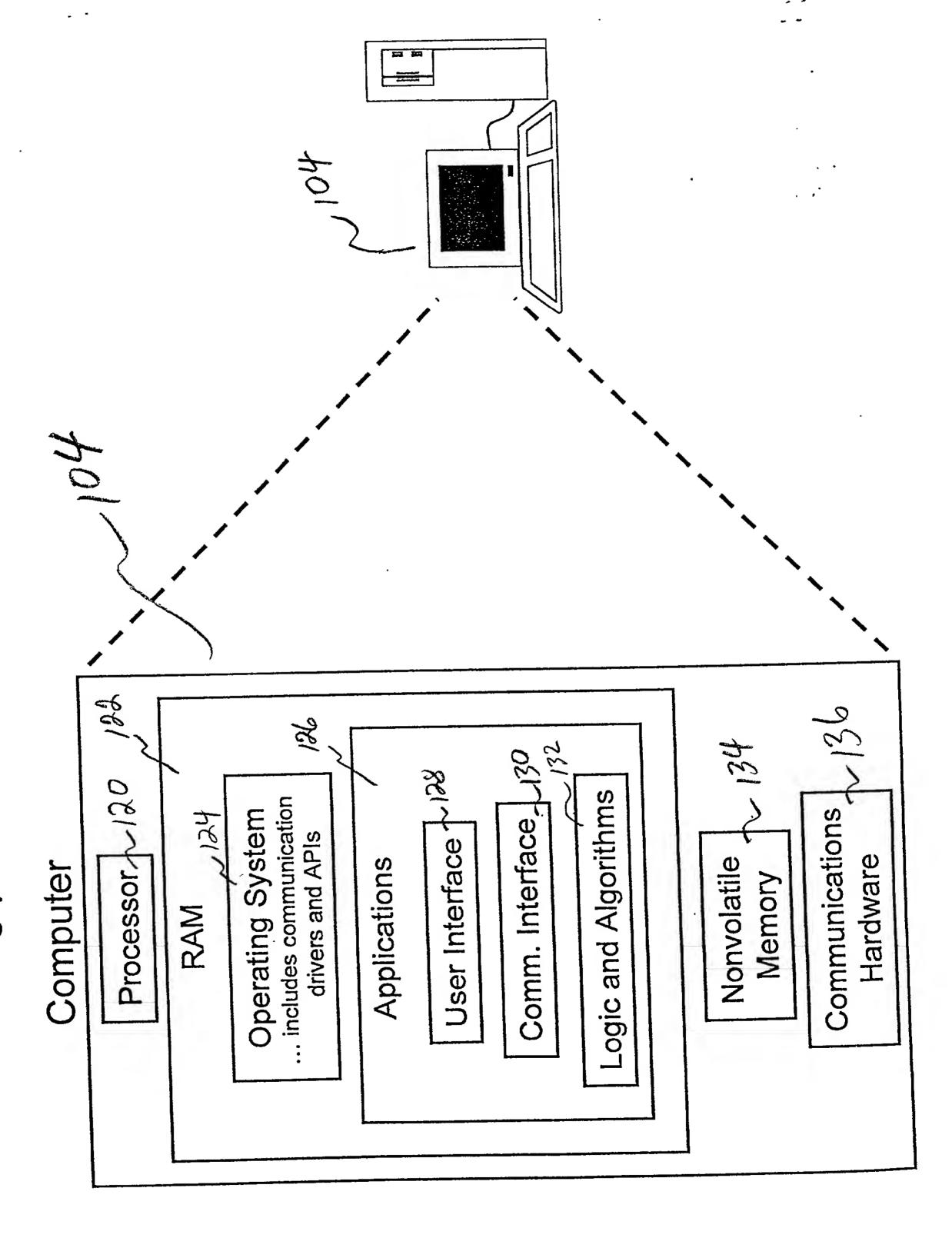


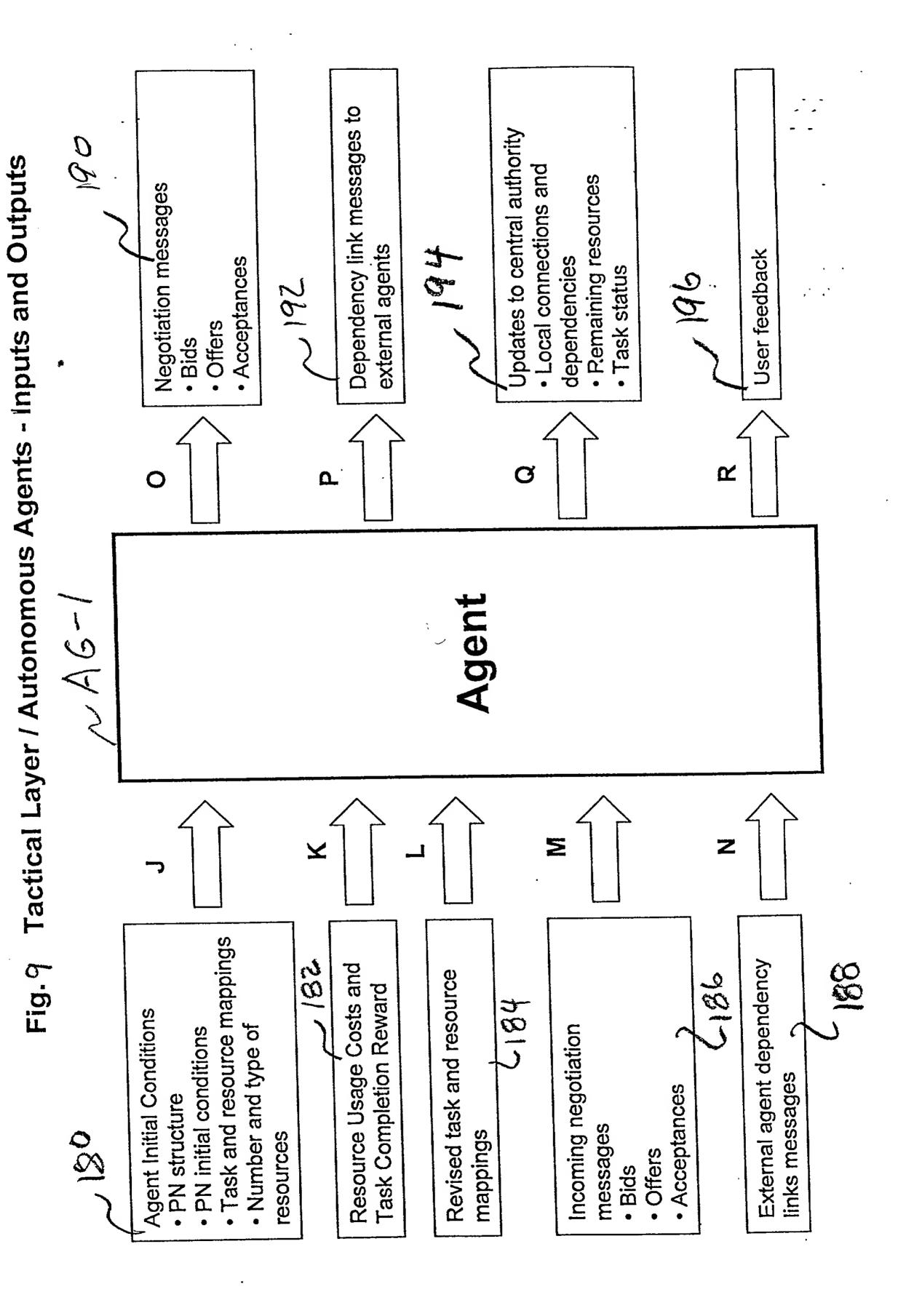
Fig. 7 Platform hardware



 Task and resource mappings Revised task and resource Resource Usage Cost and Task Completion Reward Agent Initial Conditions Number and type of PN initial conditions User feedback PN structure 62 resources mappings (1) I L **Authority** C D Central Ш is o P Petri net (PN) task components Location of task implementers Completed tasks with relative Fig. 8 Dynamic updates from agents components and PN modules Modular task representations Number and types of task Local connections and Mapping between task 50 Remaining resources Location of resources Number and types of Linear inequalities Mission constraints Mission objectives Initial conditions value assigned dependencies Task status capabilities resources

gic Layer / Central Authority - Inputs and Outputs

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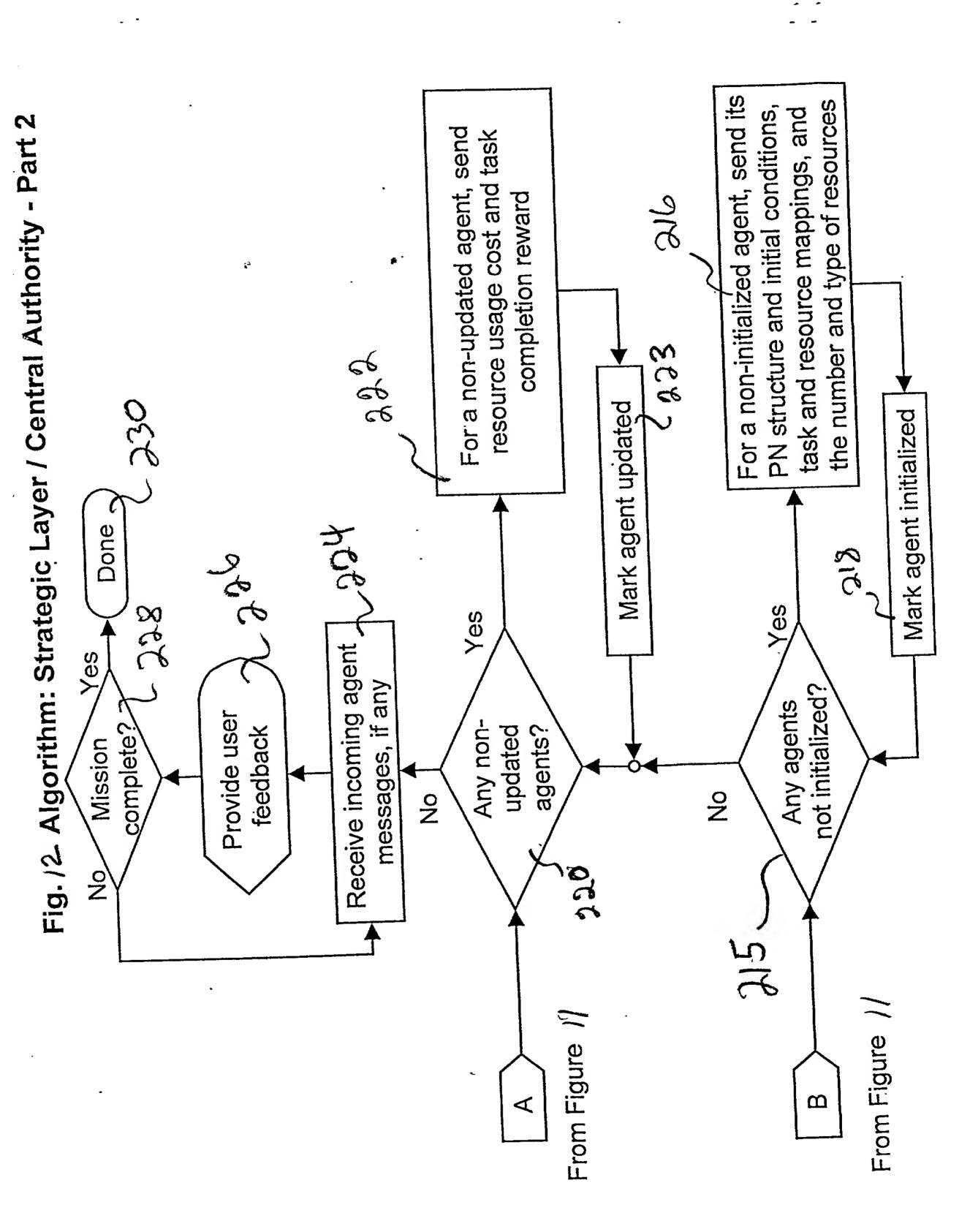
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Fig. 10 Interconnections of Central Authority and Autonomous Agents

To Figure 12 To Figure ω 802 Mark all agents as not updated Decompose overall PN model structure to enforce constraint consumption and rewards for Assign penalties for resource Construct supervisory control agents not initialized? of all resources and tasks for distribution among Construct PN model all subtask results individual agents as not initialized Mark all agents dependencies 8 Start Yes \overline{S} Mission objectives: Described in term results and basic resource costs of rewards associated with task and potential task implementers representing mission constraints of resources and task results Linear inequalities in terms Locations of resources Locations of potential agent processors mapped to task types Petri Net models rypes and number Number and type of resources of tasks of tasks

rithm: Strategic Layer / Central Authority - Part 1

Fig. // Algo



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From Figure To Figure 14 $\mathbf{\omega}$ K å 2 310 2 Yes avoidance structures Yes Calculate deadlock dependency links Setup internal PN link messages? Outgoing agent representation data received? received? Cost data Initialization Incoming Start 305 300 200 304 PN structure, PN initial conditions, Number and type of resources Task and resource mappings, resource usage cost and task Update from central authority: Setup from central authority completion reward dependency links Incoming agent

rithm: Tactical Layer / Autonomous Agents - Part 1 300 Fig. 13 Algor

